

Amphipoda from the East Coast of India—2

Gammaridea and Caprellidea

BY

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(With four text figures)

INTRODUCTION

The first part of the systematic study of the Amphipoda of the east coast of India has already been published (Sivaprakasam 1966), wherein a survey of the literature on the subject, the details of materials and methods and a systematic account of 29 species belonging to nine gammaridean families were given. Some additional species have since been recorded, bringing the total number of species studied to 61, of which 33 species are newly recorded from India. The present paper, which is the second and concluding part of the study, deals with 32 species belonging to seven gammaridean families and the family Caprellidae, of which 16 species are newly recorded from India. The ecology and geographical distribution of all the amphipods studied here are discussed at the end of the paper.

SYSTEMATIC ACCOUNT

Family TALITRIDAE

Genus *Orchestia* Leach

***Orchestia anomala* Chevreux**

(Fig. 1)

Orchestia anomala Chevreux, 1901, p. 393, figs. 8-12; Schellenberg, 1938 (a), p. 65; Stephensen, 1947, p. 23; Ruffo, 1958, p. 42. *Talorchestia malayensis* Tattersall, 1922, p. 453, pl. 21, figs. 11-20; 1925, p. 241; Barnard, KH, 1955, p. 93.

Orchestia floresiana Stephensen, 1935(a), p. 24, figs. 4-6; Barnard, KH, 1935, p. 288, fig. 7.

Material: Kilakkarai: Several males and females from under stones at the tidal edge. Pondicherry: Several specimens from the loose soil

around a freshwater pond in the Botanical garden. Tada, Pulicat Lake : Several specimens from the banks of salt-water ponds and canals.

Length : 13 mm.

Remarks : The present material closely agrees with Barnard's (1935) description of *O. floresiana*, synonymised with the present species by Schellenberg (1938). The flagellum of antenna 1 with 5 joints, the scabrous knobs on joints 4-6 in male gnathopod 1, the averted point of dactylus of gnathopod 2 of male, the numerous serrulations on hind margin of 2nd joint of peraeopod 5, the pleon segments 2 and 3 with submarginal ridges on lower margin and smooth hind margin are characteristic of this species.

From Tattersall's (1922) description of *T. malayensis*, it differs in having 5 joints instead of 3 in the flagellum of antenna 1, 6th joint of male gnathopod 2 not so broad, and telson not so shortly triangular (as observed by Barnard also).

Barnard (1935) united *T. malayensis* with his *O. floresiana* which were considered synonymous with *O. anomala* Chevreux by Schellenberg (1938). In 1955, Barnard again recorded *T. malayensis* from South Africa as a distinct species. But the presence of palm in the female gnathopod 1 in this species shows that it belongs to the genus *Orchestia*, and for the reasons advanced by Schellenberg, this species is united with the present one.

Distribution : Seychelles, South Africa, Singapore, Andaman Islands, Gulf of Siam, Philippines, Bismarck Archipelago, Comores, Marquesas, and India. The distribution of this species in India is extended from Lower Bengal to the whole east coast.

Genus *Talorchestia* Dana

***Talorchestia martensii* (Weber)**

Orchestia martensii Weber, 1892, p. 564, figs. 13-16.

Talorchestia martensii Stebbing, 1906, p. 553 ; Chilton, 1921, p. 541, fig. 8 ; Stephensen, 1935(b), p. 10 ; Barnard, KH, 1935, p. 289 ; Ruffo, 1938(a), p. 169 ; Nayar, 1959, p. 28, pl. 10, figs. 1-9.

Talorchestia gracilis Chilton, 1925, p. 535 ; Gravely, 1927, p. 123.

Talorchestia affinis Maccagno, 1936, p. 181.

Material : Large number of specimens from all the stations, collected from the tidal edge, the sea shore, the banks of brackish and freshwater canals and ponds.

Length : 10 mm.

Remarks : This is the commonest terrestrial amphipod (sandhopper) on the east coast of India. It has been collected from the sea shore among sand and decaying seaweeds and also from the loose soil along estuaries, brackish and freshwater ponds.

Distribution : Flores (East Indies), Tale Sap (Thailand), India and Red Sea.

Family HYALELLIDAE

Genus *Parhyalella* Kunkel

Parhyalella indica Barnard

(Fig. 2)

Parhyalella indica Barnard, KH, 1935, p. 294, fig, 11 a-f.

Material : Kilakkarai : Several specimens from seaweeds. Rameswaram : 8 specimens from the algae growing on rocks. Devipattinam : Several specimens from Enteromorpha weeds. Nambuthalai : Several specimens from palmyra wood floating at the tidal edge. Point Calimere : 1 female from algae.

Length : 9 mm.

Description : *Males* : Body smooth, broadly rounded. Head rather small. Eyes large, dark, reniform with front margin straight. Antenna 1 one-third as long as body ; flagellum twice as long as peduncle, 16-17 jointed. Antenna 2 a little longer than antenna 1. 5th joint of peduncle longer than the preceding. Flagellum $1\frac{1}{2}$ times as long as peduncle, 17-jointed. Mouth parts typical of the genus.

Gnathopod 1 : Side plate large, oblong, distally rounded. 2nd joint with a few long setae in the middle and at distal end of hind margin. 3rd joint longer than 4th. 5th joint funnel-shaped, longer and wider than 6th ; front margin distally with a circllet of setae ; hind margin produced distally into a lobe with a circllet of setae. Hind margin widened a little distally and with a row of 4-5 setae. Palm convex, defined by 2 stout spines. Dactylus as long as palm, closely fitting with it. *Gnathopod 2*, large and well-developed. Side plate large, oblong. 2nd joint widening distally ; hind margin with 2 sets of long setae in the middle and one at the distal end. 3rd joint a little shorter than 4th, front margin with a distal lobe. 5th joint short, produced into a spoon-shaped lobe between 4th and 6th joints. 6th joint large, oval, tapering distally. Palm very oblique, convex, twice as long as hind margin ; with a row of spines on either side and ending in a pit with 3 spines ; behind this is a

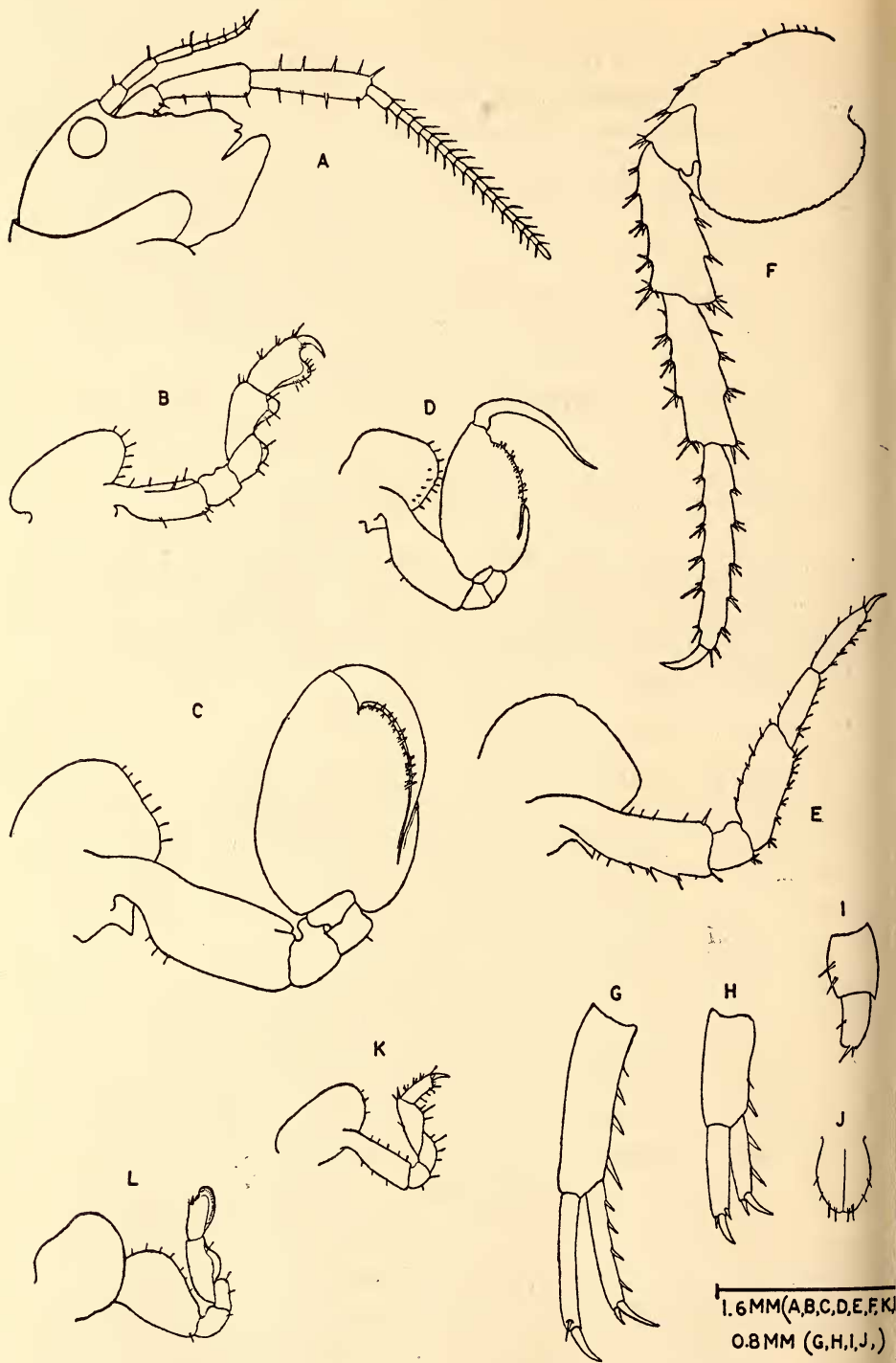


FIG. 1. *Orchestia anomala* Chevreaux. MALE: A, head; B, gnathopod 1; C, gnathopod 2 of adult; D, gnathopod 2 of young; E, peraeopod 1; F, peraeopod 5; G, uropod 1; H, uropod 2; I, uropod 3; J, telson. FEMALE: K, gnathopod 1; L, gnathopod 2.

single spine and two notches each with a seta. Dactylus long and curved, its tip lying in the palmar pit.

Peraeopods 1 and 2 similar, slender. Side plate large, broader than long. 2nd joint widest at the middle, distal half of hind margin with 3 sets of long setae. Peraeopods 3-5 very spinous. Hind margin of 2nd joint rounded and smooth.

Uropod 1 : spinous, peduncle a little longer than rami. Uropod 2 : spinous ; peduncle as long as outer ramus which is shorter than inner. Uropod 3 : uniramous ; peduncle subequal to the ramus, both distally with a spine. Telson produced conically behind, with a seta near the tip on either side.

Female: Gnathopod 1 as in male, much smaller. Gnathopod 2 as in male but less developed. Side plate oblong, larger than in male. 2nd joint $1\frac{1}{2}$ times as long as 6th. Joints 3-5 as in male. 6th joint tapering distally. Palm very oblique, undefined, reaching hind lobe of 5th joint, with a dense brush of setae. Dactylus short, half as long as palm.

Remarks : Barnard (1935) gave a short description of the features in which *P. indica* differed from *P. natalensis*. The present material differs from his description in the antennal flagella having more joints (17 as in *P. natalensis*) ; palm of gnathopod 2 in female is not defined by a notch and 3 spines as in the male.

Distribution : India. This species was originally described from Tuticorin in the Gulf of Mannar. It has now been recorded from several localities in the Gulf of Mannar and Palk Bay.

Family HYALIDAE

Genus *Hyale* Rathke

Hyale nigra (Haswell)

(Fig. 3)

Allorchestes niger Haswell, 1880(b), p. 319 ; 1885, p. 96, pl. 11, figs. 1-3.

Hyale nigra Stebbing, 1906, p. 571 ; Schellenberg, 1928, p. 659, fig. 204 ; Barnard KH, 1937, p. 162.

Hyale nilssoni Walker & Scott, 1903, p. 219, pl. 14A, fig. 3.

Material : Cape Comorin : Several specimens from seaweeds. Kilakkarai : 3 females from seaweeds. Pamban : 6 specimens from seaweeds.

Length : 6.5 mm.

Remarks : The present material is very similar to Schellenberg's (1928) description and figures of this species from the Suez Canal.

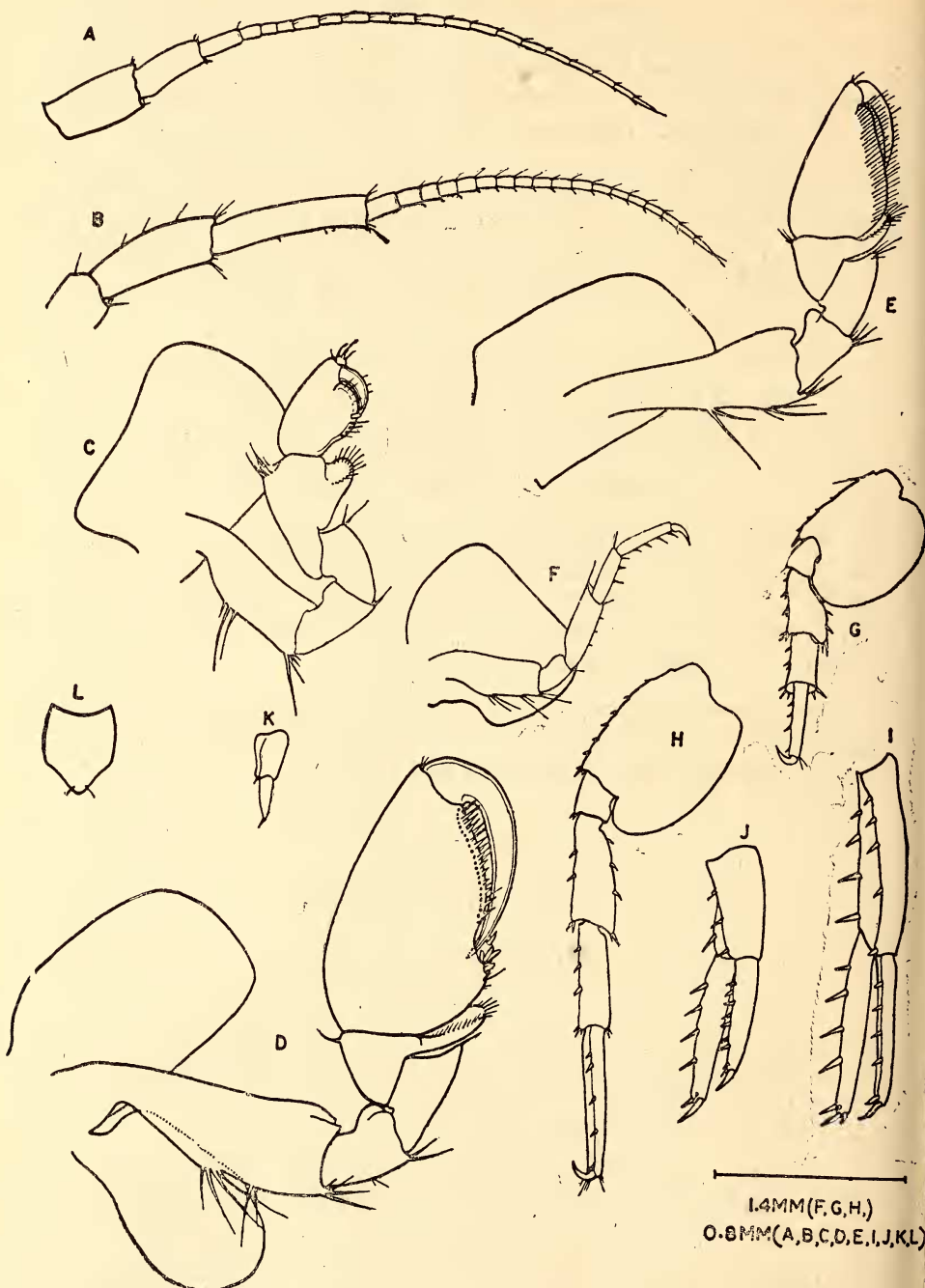


FIG. 2. *Parhyalella indica* Barnard. MALE : A, antenna 1 ; B, antenna 2 ; C, gnathopod 1 ; D, gnathopod 2 ; F, peraeopod 2 ; G, peraeopod 3 ; H, peraeopod 5 ; I, uropod 1 ; J, uropod 2 ; K, uropod 3 ; L, telson. FEMALE : E, gnathopod 2.

Walker & Scott's (1903) record of *H. nilssoni* from the Sokotra Island is similar to this species, particularly in the form of male gnathopods 1 and 2, and is therefore united with the present species. Barnard (1935) united it with *H. brevipes* Chevreux which has since been synonymised with *Parhyale hawaiiensis* (Dana) by Shoemaker (1956).

Distribution : Australia, Suez Canal, South Arabian coast, Sokotra Island, and India. This species is recorded for the first time from India.

***Hyale ayeli* Barnard**

Hyale ayeli Barnard JL, 1955, p. 14, fig. 7.

Material : Rameswaram : 3 males and 4 females from seaweeds.

Length : 7 mm.

Remarks : These specimens closely agree with Barnard's (1955) description and figures, and differ from *H. media* (Dana), a closely related species in the following points :—Antenna 1 : $\frac{3}{4}$ as long as antenna 2, flagellum with 9-10 joints. Antenna 2 a little longer than $\frac{1}{4}$ body length. Flagellum with 11-14 joints. Lower margin of 4th and 5th peduncular joints and 1st to 7th flagellar joints with thick tufts of setae. Gnathopod 1 of male : 6th joint longer than 5th, rectangular ; palm slightly oblique and convex. Gnathopod 2 of male : 2nd and 3rd joints produced into a lobe on front margin. 6th joint large, oval, palm defined by 2 spines. Dactylus stout, strongly curved at the base and near the tip. Gnathopod 2 of female similar to gnathopod 1 but larger. 6th joint rectangular, palm oblique and defined by 2 spines.

Distribution : Hawaii Islands. This is the first record of this species from India.

***Hyale affinis* Chevreux**

Hyale affinis Chevreux, 1908, p. 503, figs. 21-22 ; Schellenberg, 1938 (a), p. 67 ; Barnard JL, 1955, p. 14, fig. 6.

Material : Madras harbour : Several specimens from algae growing on concrete blocks.

Length : 7.5 mm.

Remarks : Schellenberg's (1938) comparison of his material from Hawaii with those from Gambier Archipelago described by Chevreux, shows that this species is variable. The present material resembles both their descriptions, while agreeing more with Chevreux's description. The specimens are larger, 7.5 mm. in length. Eyes moderate sized, dark,

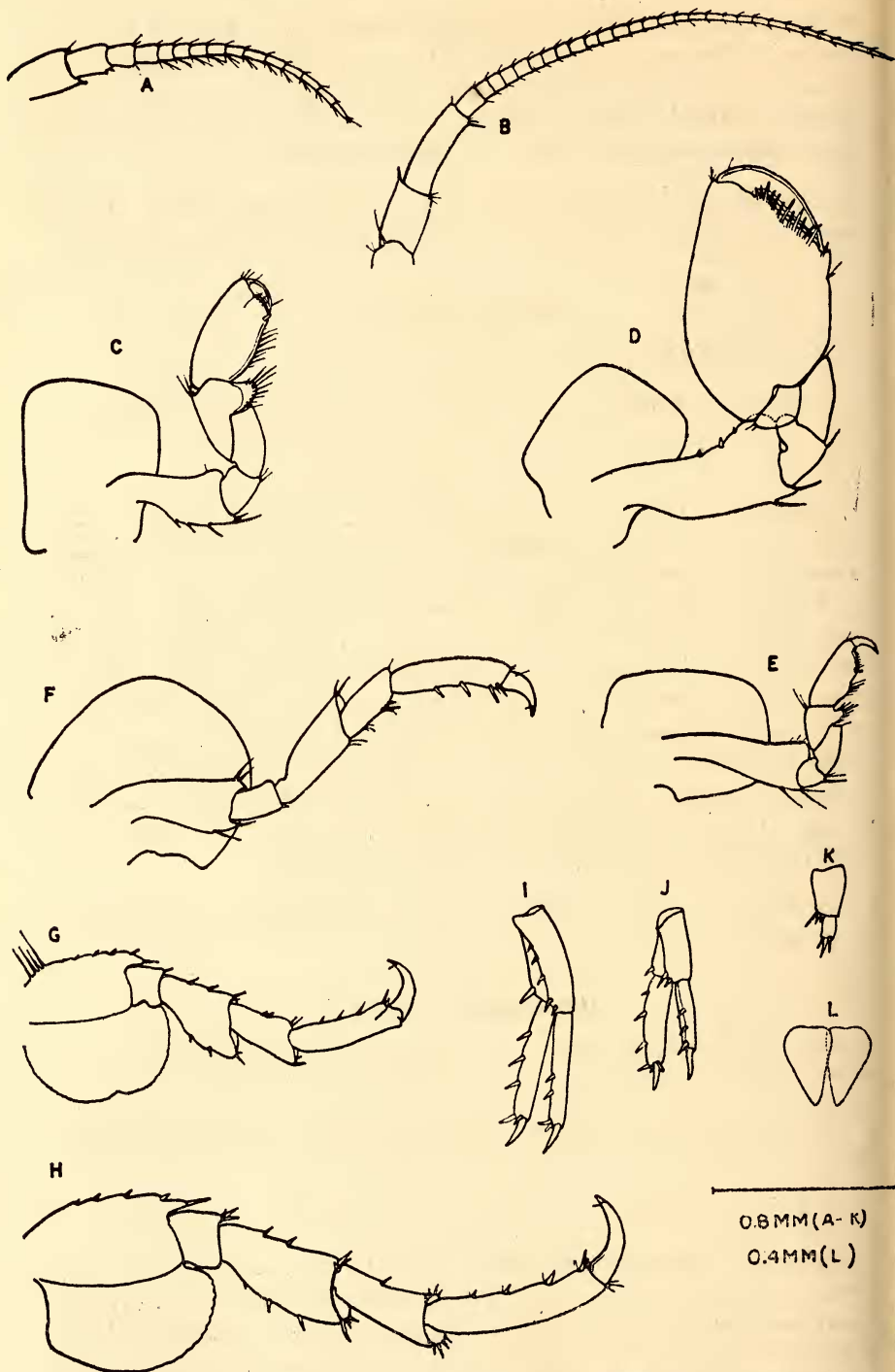


FIG. 3. *Hyale nigra* (Haswell), MALE : A, antenna 1 ; B, antenna 2 ; C, gnathopod 1 ; D, gnathopod 2 ; F, peraeopod 2 ; G, peraeopod 3 ; H, peraeopod 5 ; I, uropod 1 ; J, uropod 2 ; K, uropod 3 ; L, telson. FEMALE : E, gnathopod 2.

somewhat oval. Side plate of peraeopod 2 with a hind lobe. Antenna 1 with 2nd and 3rd peduncular joints subequal in length and flagellum with 14-16 joints. Flagellum of antenna 2 with 30-32 joints. Gnathopod 1 of male with front margin of 6th joint distally produced into a hump-like process. Gnathopod 2 of male with hind margin of 6th joint about $\frac{1}{2}$ as long as palm which is bordered on both sides by long spinules and defined below by 2 stout blunt spines. Peraeopods 1-5 : 6th joint with 4-5 spines, the penultimate one being long, stout and blunt and distinct from others. Dactylus with a subdistal setule on inner margin. Uropod 1 : Rami subequal. End spine on peduncle less than half as long as outer ramus. Uropod 3 with ramus subequal to peduncle. Female gnathopods : 6th joint more than double as long as wide ; hind margin with a fascicle of 3 setae in the middle. Palm more oblique than shown by Barnard (1955).

Distribution : Gambier Archipelago, and Hawaii Islands. This species is recorded for the first time from India.

***Hyale chevreuxi* Barnard**

(Fig. 4 A-C)

Hyale chevreuxi Barnard KH, 1916, p. 235 ; Schellenberg, 1938 (a), p. 68, fig. 35a.

Hyale macrodactylus Chevreux, 1901, p. 397, figs. 13-14 ; Walker, 1909, p. 337. (not Stebbing, 1899).

Material : Several hundred specimens from seaweeds collected from Cape Comorin, Kilakkarai, Pamban and Madras harbour.

Length : 7 mm.

Remarks : The present material agrees well with Schellenberg's (1938) description and figure of this species. Head $1\frac{1}{3}$ as long as first segment. Eyes medium-sized, round and dark. Antenna 1 about half as long as antenna 2 ; flagellum with 13-15 joints. Antenna 2 more than half the body length ; flagellum with 27-33 joints. Gnathopod 1 of male : Side plate longer than deep, widened below. 2nd joint narrow at the base and widening distally. 3rd joint lobed in front, 6th joint triangular, the ratio of length to width 7 : 4 ; front margin convex ; hind margin straight near its junction with palm and concave proximally. Palm short, oblique, defined by a spine. Dactylus rather slender. Gnathopod 2 of male : Side plate quadrate. 2nd joint narrow at the base and widening distally ; hind margin with 4 sets of spinules and front margin expanded, with close-set setae (about 20 in number). 3rd joint lobed in front. 6th joint large, elongate-oval in form ; front margin naked except for a spinule near the base ; hind margin $\frac{2}{5}$ as long as palm.

Palm very oblique, slightly convex, bordered by a thick comb of setae on the inner aspect and by both spinules and setae on the outer. Dactylus

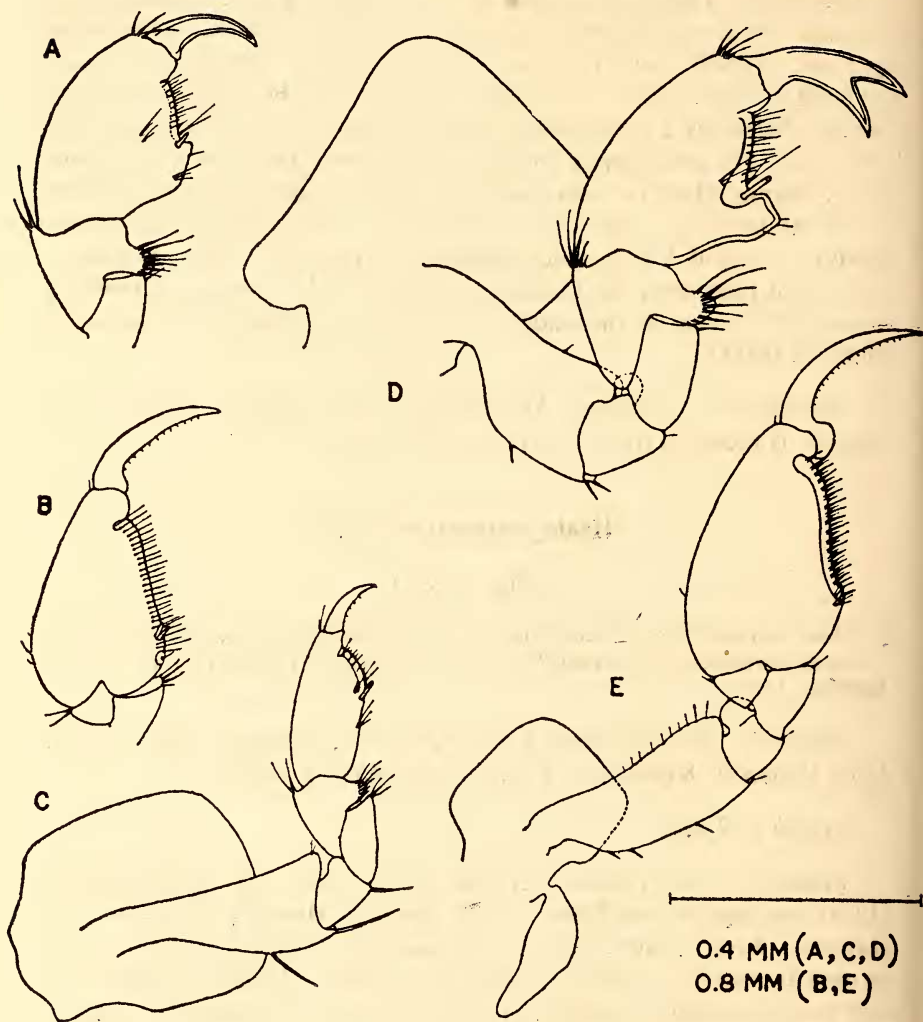


FIG. 4.—A-C : *Hyale chevreuxi* Barnard. A, gnathopod 1 of male ; B, gnathopod 2 of male ; C, gnathopod 2 of female. D-E : *Hyale diploactyla* Stebbing. D, gnathopod 1 of male ; E, gnathopod 2 of male.

as long as palm, smoothly narrowing, with setules on inner margin. Peraeopods : 6th joint with 5 slender spines gradually increasing in length, the last one being shorter. Dactylus with a setule near its tip. Side plate of peraeopod 2 produced behind. 2nd joint imperfectly serrate in peraeopods 3-5 and with an indent in the middle in peraeopods 3-4. Uropod 1 : Peduncle longer than rami, with a terminal spine. Uropod 2 : Outer

ramus longer than the inner which is subequal to peduncle. Uropod 3 : Peduncle longer than ramus. Telson lobes long, conical and pointed behind. Female gnathopod 1 a little smaller than gnathopod 2, otherwise identical. 6th joint nearly rectangular, the ratio of length to width being 7 : 3. Hind margin with a set of 3-4 setae in the middle. Palm slightly oblique, defined by 2 spines.

Distribution : Seychelles, Chagos Archipelago, and Gilbert Island (South Pacific Ocean). This is the first record of this species from India.

***Hyale diplodactyla* Stebbing**

(Fig. 4 D-E)

Hyale diplodactylus Stebbing, 1899, p. 403, pl. 31C.; 1906, p. 562, fig. 95 ;
Ruffo, 1956, p. 213.

Material : Cape Comorin : 2 males and 1 female from seaweeds.
Pamban : Several specimens from seaweeds.

Length : 6 mm.

Remarks : The present material closely agrees with Stebbing's (1899) description and figures. Eyes are medium-sized, round and dark. Antenna 1 half as long as antenna 2 ; flagellum with about 13 joints. Antenna 2 less than half as long as body ; flagellum with about 27 joints, inner margin with short, thick setae. Gnathopod 1 of male : Side plate longer than broad, slightly widened below. 2nd joint narrow proximally and widening distally ; front margin produced. 3rd joint lobed in front. 6th joint somewhat triangular with front margin convex and hind margin concave. Palm oblique, concave and defined by a blunt spine ; the junction of palm and hind margin produced into an angular lobe with a fascicle of setae ; palm excavated into a pocket on the inner aspect to receive the tip of dactylus. Dactylus deeply bifurcated from its tip to about $\frac{1}{3}$ its length. The bifurcation of the dactylus appears to take place at a late stage of the animal. In a 5 mm. long specimen the dactylus was not bifurcate but had a swelling on the outer side at about $\frac{1}{3}$ its length from the tip. In a still larger specimen (5.5 mm.) the dactylus of the right side was in this condition and the left one was bifurcate. Gnathopod 2 of male : Side plate quadrate. 2nd joint widening distally ; front margin expanded in front, with rather close-set setae (about 12 in number). 3rd joint lobed in front. 6th joint large, elongate-oval in form, widest at the base. Front margin with 2 separate spines in the proximal $\frac{1}{3}$ of its length. Hind margin shorter than palm. Palm very oblique, slightly convex, bordered on both sides by spinules, large ones alternating with short ones, and ending in a pocket with 2 blunt spines to

receive the tip of dactylus. Dactylus as long as palm, with a rounded tooth at the base. Peraeopods, uropods, telson and the female as described above for *H. chevreuxi*.

Distribution : West Indies and India.

***Hyale macrodactyla* Stebbing**

Hyale macrodactylus Stebbing, 1899, p. 404, pl. 31D.

Hyale macrodactyla Stebbing, 1906, p. 564, fig. 96 ; Barnard KH, 1916, p. 235 ; Schellenberg, 1939, p. 129 ; Ruffo, 1954, p. 119.

Material : Several hundred specimens from seaweeds collected from Pamban, Kovelong, Madras Harbour and Royapuram.

Length : 7.5 mm.

Remarks : The present material agrees well with Stebbing's (1899) description and figures except that they are much larger and that there is no emargination between two slight swellings in the distal part of palm of male gnathopod 2.

The antennae and the gnathopods of male undergo considerable changes with growth. In a juvenile 4 mm. in length, flagellum of antenna 1 had 12 joints and that of antenna 2 had 24 joints. 6th joint of gnathopod 1 nearly rectangular, 2.1 as long as broad. 6th joint of gnathopod 2 with palm as long as hind margin. In a larger male (5 mm.) 6th joint of gnathopod 1 was elliptical, 1.7 as long as broadest portion.

In the adult males (7.5 mm.), eyes were rather large, dark and round. Antenna 1 half as long as antenna 2, flagellum with 15-16 joints. Antenna 2 less than half body length, flagellum with 29-30 joints. Gnathopod 1 : Side plate longer than deep, slightly widened below. 2nd joint narrow at the base ; front margin expanded distally with 2 spinules. 3rd joint lobed in front. 6th joint oblong-oval, 1.6 as long as widest portion. Palm oblique, convex, defined by 2 blunt spines. Hind margin angularly produced, proximal $\frac{2}{3}$ straight, ending in a fascicle of 2-3 setae which separate the distal $\frac{1}{3}$ which is rounded and continuous with the palm. Dactylus stout, curved, and a little longer than palm. Gnathopod 2 : Side plate quadrate. 2nd joint distally lobed in front, with 1 or 2 setules. 3rd joint lobed in front. 5th joint with a stout distal spine on front margin. 6th joint large, elongate, widest at the base. Front margin naked. Palm extending over the whole length of the joint, nearly straight, the distal part slightly convex and the proximal slightly concave and ending in a pocket with 2 blunt spines ; palm bordered on both sides by continuous rows of slender spinules. Dactylus reaching end of 4th joint, wider in the middle and blunt at the tip. Peraeopods : Dactylus stout, curved and with a subterminal setule. 6th joint in

peraeopods 1-3 with 4 spines, the third being enlarged into a stout, blunt spine. 6th joint in peraeopods 4-5 with 5 spines of which 4th is enlarged into a stout blunt spine. 2nd joint orbicular in peraeopods 3 and 5 and oblong in 4th; hind margin imperfectly serrate in all and with a middle notch in peraeopod 3. Hind corner of 3rd epimere not acute. Uropod 1: Peduncle as long as outer ramus with an enlarged distal spine. Uropod 2: Peduncle as long as outer ramus which is shorter than inner. Uropod 3: Peduncle as long as ramus. Telson lobes longer than broad, conical behind.

Female: Gnathopod 1 similar to the next but a little smaller. Gnathopod 2: 6th joint rectangular, twice as long as broad. Palm oblique, convex, defined by 2 spines. Hind margin longer than palm, demarcated by a set of setae into proximal convex part and distal concave part. Dactylus rather stout.

Nayar's (1959) record of *H. honoluluensis* appears to be this species. The male gnathopods are more like *H. macrodactyla*.

Distribution: West Indies, Brazil, Venezuela, Senegal, South Africa and Congo. This is the first record of this species from India.

(to be continued)